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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

IN RE APPLICATION OF : Peter Dyke et al
SERIAL NO : 09/540,642
FILED : March 31, 2000
FOR : System and Method for Transfer of IP
Data in an Optical Communication
System
EXAMINER : Michael J Molinari
GROUP ART UNIT : 2665
CUSTOMER NUMBER : 23644

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Name of person signing Jennifer J. Ramirez

Signature

BRIEF ON APPEAL

This appeal is from the Examiner's final rejection of January 21, 2004 and the advisory action of March 26, 2004, in which all pending claims were rejected. A timely Notice of Appeal was filed on April 21, 2004, with the required fee of \$330.00.

This brief is being filed in triplicate, along with the required \$330.00 fee pursuant to 37 C.F.R. § 1.17(c).

(1) Real Party in Interest

This application is assigned to Nortel Networks Corporation, which by change of name is now Nortel Networks Limited. Nortel Networks is the real party in interest.

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(2) Related Appeals and Interferences

There are no related appeals or interferences.

(3) Status of Claims

This application was filed with claims 1 through 19. On 25 August 2003, claims 17 to 19 were amended. On 8 January 2004 claims 7 and 17 were amended and claims 9 to 11 were cancelled. Claims 1 - 8 and 12 - 19 (erroneously identified as 1 to 19) were finally rejected in the final office action of 21 January 2004. A further response, not amending the claims, was filed 18 March 2004. Claims 1 - 18 and 12 - 19 as amended during the prosecution of the application are set forth in the appendix, and are the claims appealed.

(4) Status of Amendments

No claim amendments were made in response to the final rejection of 21 January 2004 (but the 18 March 2004 response was filed) or the subsequent advisory action of March 26, 2004, and so the claims now pending are the same as those finally rejected.

(5) Summary of Invention

The invention is concerned with telecommunications systems for carrying data in an optical fiber between exchanges and end-users (called ONUs or outstations). It is concerned with addressing the issue of complexity and cost of existing systems. Page 2 explains:

"The sharing of the optical resource does, however, require certain control mechanisms for the ONUs and their upstream transmission which are, in generality, addressed by using marshalling (i.e. ranging) some form of time division multiple access technique. It is therefore necessary for a large-scale integrated (LSI) chip to be located in each outstation, which LSI includes a processing engine that manages data control data and bandwidth allocation as well as modulation, protocol conversion/adaptation and error correction). Consequently, an APON LSI component is both complex and expensive. Protocol conversion (i.e. ATM adaptation) from, say, an IP to an ATM domain is processor intensive, time consuming and also expensive."

Claim 1 specifies an optical line termination (OLT) and:

“an optical splitter providing a point-to-multipoint concentration/distribution function between the OLT equipment and the plurality of outstations, wherein:
the OLT equipment comprises collision detection logic to support media access control of the plurality of outstations to the OLT equipment via the optical splitter....”

A consequence is that the “invention therefore, beneficially, reduces the complexity of outstations by removing the burdens of the high cost and complexity associated with locating an APON LSI or collision detection unit at each outstation.”

(6) Issues

There are two issues:

(1) The rejection of claims 1, 2, 5 - 7, 11, 13, 15 and 17 under 35 U.S.C. §102 as being anticipated by Darcie (U.S. 6,493,335).

(2) The rejection of claims 3, 4, 8, 14, 16, 18 and 19 under 35 U.S.C. §103 as being obvious over Darcie.

(7) Grouping of Claims

The claims are in two groups, claims 1-4, which include an OLT and a splitter, and claims 5-8, and 12-19 which specify an OLT or base station or exchange equipment without referring to a splitter.

(8) Arguments

The issue which controls allowability of all claims is whether Darcie shows an optical line termination (OLT) having collision detection logic to support media access control. As this enables the advantages of simpler, lower cost outstations, without this feature, Darcie does not affect the novelty or the non-obviousness of all the claims.

The arguments on file so far relating to the collision detection logic will be summarized briefly. In the second office action, the Examiner referred to column 5, lines 1-12 of Darcie

and the disclosure that "for those packets damaged due to collisions within the IN's local serving area, the bridger 14 has the built-in function to automatically discard those packets". The Examiner tried to argue that the bridger has the ability to "detect collisions within received packets".

In the second response, the applicant explained that the switched bridger 14 automatically discarding damaged packets does not mean that it performs collision detection and one skilled in the art would not interpret it as such. In the context of the paragraph, it is intermediate node IN 15 not the bridger, which is described as resolving local contention (i.e. performing collision detection), column 5, lines 1-3 and lines 9-12. It is technically inconsistent to try to argue that collision detection for access control is carried out in two places separately. This is confirmed by the detailed disclosure of collision detection and access control in Darcie as a whole which consistently describes that the Intermediate Nodes (INs) in conjunction with the End Users (EUs) perform collision detection, without input from the bridger. This is confirmed by the fact that the switched bridger 14 is described in the greatest detail at column 4, lines 38 to 59. This passage contains no disclosure whatsoever of collision detection functionality. Switched bridger 14 is simply a packet switching device.

In the advisory action, the Examiner acknowledged that the collision detection in the head end (the bridger) does not perform the same operation as the collision detection in the intermediate node, but tries to argue that because it contains logic that can detect a collision, it still meets the requirement claimed.

This issue will now be considered in more detail. For ease of reference, the relevant part of Darcie is as follows (col 5 lines 1-12):

"IN 15 resolves local contention and passes the upstream packets to the distribution port of the switched bridger 14. The bridger then routes the packets. For those packets damaged due to collisions within the IN's local serving area, the bridger has the built in function to automatically discard those packets.....the system of the invention uses each IN 15 to coordinate the upstream traffic and resolve contention in each IN's local serving area independent of other parts of the network."

The relevant claim feature in claim 1 is "OLT equipment comprises collision detection logic to support media access control of the plurality of outstations".

The Examiner has not contradicted the assertion of the applicant that the bridge only switches packets. This switching is carried out according to the destination indicated in their header, and if a packet is damaged, its destination cannot be determined, and so it cannot be routed and it is discarded. Discarding usually means ignoring the packets. So the bridge is merely acting as a conventional switch or router. Any bridge or router downstream would presumably do the same. There is no disclosure of any specific collision damage detection circuitry. The Examiner nevertheless tries to argue that such ignoring of damaged packets can somehow be interpreted as an example of collision detection.

This leads on to the question of whether there is any detection at all. The bridge operates on undamaged packets only, and the discarding is effectively ignoring damaged packets. Normal usage of the word "detection" implies that knowledge or perception that a packet is damaged is generated for some purpose. But the bridge does nothing. It ignores damaged packets, presumably because it cannot do anything else with them. It does not alert any other part of the network of this, nor apparently does it even record the event. Can doing nothing really be regarded as "detection" in the sense of generating a knowledge or perception? If so, that knowledge or perception seems to be lost the instant it is generated. Furthermore, the claim specifies "detection logic", and logic usually implies an operation and an output of a detection state. The only logic in the bridge seems to be for switching or routing, there is no logic for outputting a detection state for any purpose.

Even if somehow the words "collision detection logic" can be strained this far, to encompass the bridge, this is still not enough to meet the claim feature. The claim says "collision detection logic to support media access control of the plurality of outstations". The Examiner cannot ignore the part of the phrase "to support media access control". Detection logic to support media access control implies there must be some use of the detection logic relating to the media access. In Darcie, the bridge contributes nothing to the access control. It does not alert any part of the network of a detection, it merely ignores damaged packets. Darcie consistently reinforces the point that the intermediate node does the contention resolution independently of other parts of the network.

Finally, even if all these points can somehow be overcome, there is no disclosure in Darcie of the claim feature of the collision detection logic being part of the OLT. The bridger of Darcie is located at the Head end or Central Office CO, and there may be an optical line termination at the same CO. But Darcie does not say the bridger is an example of an OLT. The bridger is clearly not an OLT. The switching or routing function of the bridger is clearly a different function from the optical line termination function, even if both take place at the same place. Hence even if the bridger of Darcie is somehow seen as an example of collision detection logic, it is not an example of an OLT having collision detection logic.

Furthermore, Darcie does not disclose an OLT with collision detection logic, in the context of a network having an optical splitter, as claimed. Most of the embodiments of Darcie use an electronic IN, rather than an optical splitter. When an example is described for an optical star network having an IN in the form of a remote node RN such as an optical splitter of a PON, the arrangement of the collision detection and contention control is explained carefully (col 17 lines 3 to 15), as the Examiner has pointed out. This passage explains that the splitter is arranged to alert all end users EU of any upstream traffic, either by broadcasting a traffic information signal TIS, or by passively looping back the upstream signals downstream to all end users. Then each EU can wait until all upstream paths are quiet before transmitting. This inevitably means there is no collision detection at the head end (OLT), and therefore the EU will have the collision detection and the resulting complexity and cost. Hence there is no disclosure of the claimed OLT having collision detection, upstream of an optical splitter, nor the advantage of enabling the splitter and EU to be simpler and less expensive.

Hence Darcie cannot anticipate claim 1. Regarding non-obviousness, there is no suggestion in Darcie of the advantage of doing collision detection at an OLT, upstream of an optical splitter, to reduce the complexity and cost of the splitter and EUs.

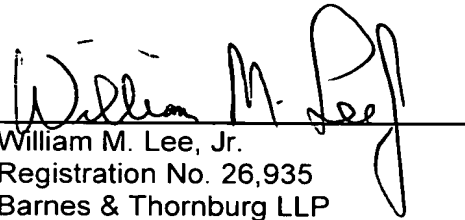
The other independent claims have corresponding features, other than the splitter. Claim 5 is to the OLT itself, arranged to detect collisions. Claims 12, 15 and 17 are to methods of detecting collisions at a base station which receives an optical carrier, or at an OLT or at exchange equipment which receives an optical carrier respectively, and carrying out access

control from there, according to the collision detection. Hence these claims are allowable for similar reasons, excepting those reasons which rely on the splitter.

Therefore, the Examiner's rejections have been demonstrated to be clearly in error, and reversal is urged.

June 21, 2004

Respectfully submitted,

A handwritten signature in black ink, appearing to read "William M. Lee, Jr.", is written over a horizontal line. The signature is stylized with a large, looped "L" and "J".

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Appendix

1. A communication system comprising optical line termination (OLT) equipment coupled to a plurality of outstations through an optical communication resource, the optical communication resource including an optical splitter providing a point-to-multipoint concentration/distribution function between the OLT equipment and the plurality of outstations, wherein:

the OLT equipment comprises collision detection logic to support media access control of the plurality of outstations to the OLT equipment via the optical splitter and over the optical communication resource, the collision detection logic responsive to packet-switched encoded data communicated thereto through the optical communication resource, the packet-switched encoded data realising a transport mechanism through the optical communication resource; and wherein

each of the plurality of outstations is adapted to pass data in a packet-switched format to and from the optical communication resource such that packet-switched encoded data is transported, in use, directly between the outstation and the OLT equipment.

2. The communication system of claim 1, wherein the collision detection logic includes at least one of:

means for monitoring a root-mean-square (rms) level of a signal communicated across the optical communication resource on one of an instantaneous and time-averaged basis;

means for monitoring a peak-to-peak level of a signal communicated across the optical communication resource on one of an instantaneous and time-averaged basis;

means for identifying invalid recovered data bits; and

means for contrasting received signal signatures to identify irregularities indicative of data collision.

3. The communication system of claim 1, wherein the packet-switched encoded data is Internet Protocol (IP).

4. The communication system of claim 3, wherein the plurality of outstations each include a signal processor arranged, in use, to code incident IP packets within a predetermined line code.

5. Optical line termination (OLT) equipment responsive, in use, to a modulated optical carrier supporting a packet-switched protocol coded into a predetermined line code format, the modulated optical carrier emanating from at least one outstation, the optical line termination equipment comprising:

collision detection logic to support media access control of a plurality of outstations to the OLT equipment, the collision detection logic responsive to packet-switched encoded data communicated thereto.

6. Optical line termination (OLT) equipment according to claim 5, further comprising:
means for coding packet-switched protocol packets into a predetermined line code format; and

means for modulating the predetermined line code onto an optical carrier;

wherein packet-switched coded data realises a transport mechanism through an optical communication resource connectable, in use, to the OLT equipment; and wherein the OLT equipment is adapted to pass data in a packet-switched format to and from the optical communication resource such that packet-switched encoded data is transported, in use, directly between the OLT equipment and an outstation.

7. Optical line termination (OLT) equipment according to claim 5, further comprising means for notifying outstations of a data collision event, said means for notifying responsive to the collision detection logic.

8. Optical line termination (OLT) equipment according to claim 5, wherein the packet-switched protocol is Internet Protocol (IP).

9-11. (Canceled)

12. A method of operating base station equipment for a communication exchange, the method comprising:

receiving an optical carrier modulated with a line code supporting packet-switched protocol packaged data;

detecting uplink collisions; and

administering media access control to a plurality of outstations connectable to the communication exchange through an optical communication resource, wherein media access control is regulated by the base station according to uplink collision of packet-switched encoded data received in modulated optical carriers.

13. The method of operating the base station equipment of claim 12, further comprising:
coding packet-switched packets into a line code format; and
modulating the predetermined line code onto an optical carrier;
wherein packet-switched encoded data realises a transport mechanism through the optical communication resource; and wherein the base station is adapted to pass data in an packet-switched format to and from the optical communication resource such that packet-switched encoded data is transported, in use, directly between the base station and an outstation.

14. The method of operating the base station equipment of claim 12, wherein the packet-switched protocol is Internet Protocol (IP).

15. A method of communicating information between outstations and optical line termination equipment via an optical fibre, the method comprising:
receiving data packetised in a packet-switched format;
coding the packet-switched formatted data into a line code;
modulating the line code onto an optical carrier;
applying a resultant modulated optical carrier to the optical communication resource, wherein the packet-switched formatted data realises a transport mechanism through the optical fibre and the packet-switched formatted data is passed to and from the optical communication resource such that packet-switched formatted data is transported, in use, directly between the outstations and the optical line termination equipment;
detecting, at the optical line termination equipment, uplink collisions; and
administering media access control of outstations according to the detecting of uplink collision of packet-switched encoded data received in modulated optical carriers.

16. The method of communicating information between outstations and optical line termination equipment via an optical fibre according to claim 15, wherein the packet-switched protocol is Internet Protocol (IP).

17. A computer-readable medium comprising computer-readable instructions for controlling exchange equipment to administer media access control of a plurality of optical outstations coupled to the exchange equipment through an optical fibre, the computer-readable instructions comprising:

code that directs the exchange equipment to receive an optical carrier modulated with a line code supporting packet-switched protocol packaged data;

code that directs the exchange equipment to detect uplink collisions; and

code that directs the exchange equipment to administer media access control of the plurality of optical outstations based on detection of uplink collision of packet-switched protocol encoded data received in modulated optical carriers.

18. The computer-readable medium comprising computer-readable instructions of claim 17, wherein the packet-switched protocol is Internet Protocol (IP).

19. The computer-readable medium comprising computer-readable instructions of claim 18, further comprising:

code that directs the exchange equipment to code IP packets into a line code format; and

code that directs the exchange equipment to modulate the line code onto an optical carrier, wherein IP encoded data realises a transport mechanism through the optical fibre; code that directs the exchange equipment to pass data in an IP format to and from the optical fibre such that IP encoded data is transported, in use, directly between the exchange equipment and at least one outstation.